Analysing the impact of e-learning technology on students' engagement, attendance and performance

Raj. Kapur Shah[1*] and Linda Anne Barkas[2]

[1]Senior Lecturer, Department of the Built Environment (BUE), Faculty of Engineering and Technology (FET), Liverpool John Moores University, Liverpool, L3 3AF, UK

* Corresponding Email: r.shah@ljmu.ac.uk

[2] Senior Lecturer in Business Management, Faculty of Business, Law and Tourism, University of Sunderland, UK, Reg Vardy Centre, St Peter's, Sunderland, SR6 0AN; Telephone: 0191 5152432; Email: linda.anne.barkas@sunderland.ac.uk.

Abstract:

In higher education, e-learning technology, such as Blackboard (Bb) is widely used and has become a popular worldwide tool. It helps reduce the communication gap between students and tutors, without time and location constraints. The study of student engagement and the impact on performance is a key issue in higher educational research, so identifying how students use e-learning technology can help contribute to how to design e-learning materials that further support student engagement. The quantitative research study examined two undergraduate engineering modules. Utilising the statistical package for the social sciences (SPSS) the number of clicks students made on Bb was assessed against their classroom attendance, engagement with activities and their performance in the final grade in the module assessment. The outcomes contribute to the developing literature on students' interaction with online learning, by providing an insight into the way students' use of e-learning materials influences their performance in their studies.

Keywords: Attendance**,** Blackboard, Communication, Engagement, e-learning Technology, Higher education, Bb clicks/hits, Performance,

1. Introduction

This article presents the findings of an initial study that was undertaken to examine how the use of Blackboard could identify the extent to which students' utilised online materials on their engineering courses. The study was undertaken to explore if regular links to the online resources was related to their attendance and supported their engagement with their studies. The findings contribute to the literature on how the development of web-based technologies can enhance students' performance in higher education.

2. Literature review

The Development of Web-based technologies.

The ease of access to online materials has also become more common due to advancement in information technology via e-devices such as Desktops, Laptops and Smartphones. Although new e-learning resources are appearing all the time in education, one of the most prolific VLEs, is Blackboard (Bb). Bb is a system that allows users to access it via a unique username and password to 'log-in' to their subject modules/programme. It started as "one of leading commercial learning management systems and then shifted to wide use as a course management system software package in educational institutions (Guo, Zhang and Guo 2016; Zidan 2015, p.230).

Electronic-learning through the World Wide Web, or e-learning via the internet, as it is now more commonly known, has become possible because of the advancements in communication, networking and broadcast technologies. The use of electronic materials is heavily researched from a number of different perspectives (Flavin and Quintero, 2018). For example, research by Hewitt and Stubbs, (2017) examined how learning technology could

help address law students' anxiety about their studies and improve their self-efficacy. A study by Young and Nichols (2017) examined how academics embedded digital learning approaches into the curriculum. Throughout this extensive research, the debates surrounding the use of the internet and related advanced technologies have acquired a number of different terms, which are frequently used interchangeably in the literature. For example, blended learning, distance education/learning; online environment learning; web-based instruction and more recently Virtual Learning Environments (VLEs) (Young and Nicols, 2017) VLEs such as Blackboard (Bb), Canvas and WebChat (Web CT) can be available twenty-four hours per day, all year around.

Universities may have many national and international students studying on their programmes, so within this heavily competitive marketisation and internationalisation of higher education, they have to ensure they stay up-to-date with the latest e-learning technologies to improve communications, and student engagement and performance. This technology also helps to improve student engagement in terms of the time spent on a task, quality of effort and student involvement. The challenges and benefits of e-learning have been discussed in many articles (see *inter-alia* Altuna and Lareki 2015; Raab, Ellis and Abdon 2002; Bouhnik and Marcus 2006; Liaw *et al*, 2007), but a common thread throughout the research is the importance of e-learning technologies as a support mechanism for helping students to engage in their studies. Starting with a discussion of what is meant by *engagement*, the following section highlights some of the issues surrounding the use of e-learning technologies.

What is *engagement?*

The generic term *engagement* employed throughout the literature on higher education, depicts students' study patterns, how they use their time, resources, relationships and

communications with their tutors, peers and the organisation (Kahn 2014; Trowler 2010). Theories of how best to do this, however, vary across and within disciplines. From, the behavioural perspective, it is defined as the 'time and effort students devote to educationally purposeful activities' (ACER 2010b), but from the psychological perspective, cognition incorporates individual characteristics such as motivation, self-efficacy and expectations as part of student engagement (Jimerson, Campos and Greif 2003). Researchers in the UK have proposed a more holistic definition: 'The conception of engagement encompasses the perceptions, expectations and experience of being a student and the construction of being a student' (Bryson, Hardy and Hand 2009). Whichever definition is postulated, research into improving students' engagement in their studies embraces all the quality enhancement and quality assurance processes, ensuing in the improvement of the educational experience (The UK Quality Code for the Higher Education, 2012).

Some studies have examined the students' feelings and emotions surrounding the process of engagement. According to Harper and Quaye (2009a), student engagement is more than just involvement or participation. It requires a positive frame of mind and 'mood' and 'sense making' in addition to the physical active involvement in different types of activities within the academic environment. Acting without sentiment, engagement is just like participation; or feeling engaged without acting is known as dissociation. Fredricks, Blumenfeld and Paris (2004) classified student engagement into three dimensions (see Table 1 below).

Table 1: Examples of positive, negative engagement and non-engagement

Types\	**Positive engagement**	**Non-engagement**	**Negative engagement**
Behavioural	Attends lectures, participates with enthusiasm	Skips lectures without excuse	Boycotts, pickets or disrupts lectures
Emotional	Interest	Boredom	Rejection
Cognitive	Meets or exceeds assignment requirements	Assignments late, rushed or absent	Redefines parameters for assignments

- Behavioural engagement: Students who are behaviourally engaged would typically comply with behavioural norms, such as attendance and involvement, and would demonstrate the absence of disruptive or negative behaviour.
- Emotional engagement: Students who engage emotionally would experience affective reactions such as interest, enjoyment, or a sense of belonging.
- Cognitive engagement: Cognitively engaged students would be invested in their learning, would seek to go beyond the requirements, and would relish challenge.

A study by Stewart *et al* (2011) about the relationship between student engagement in terms of attendance, online learning and performance was inconclusive, but their findings did demonstrate the importance of attendance as a predictor of performance and argues it is influenced by the study behaviour rather than time spent on accessing the resources (Bb clicks/hits), particularly online resources. They also suggested that an integrated blended learning approach could help to improve the student performance.

How does technology enhance engagement?

While research into helping students engage with their studies has shown the importance of good communications; starting with clear guidance to students about what it is they will study, assessment and feedback (HEA 2017; Kahu 2013, Thomas 2012), the complexity of this process is articulated in research findings across both the general and specialist literature on higher education (Zepke 2014). The emerging research into how students' think and feel about their studies has also added to the intricacies of the debates whilst contributing to how different resources might be used in various ways to positively enhance the students' experience and performance (Hewitt and Stubbs, 2017). The stronger the engagement, the better the student is seen to perform (Trowler 2010).

The student profile in higher education has changed considerably over the past two decades, not only with the internationalisation of the curriculum (HEA, 2017) but with the attendance patterns of students. While the traditional, full-time student remains, many students now work part-time, or combine distance learning with course attendance. This change in study patterns has necessitated the use of web-based technologies.

The research study and limitations

The study concentrated on exploring the relationship that might exist between student engagement, attendance and performance. The study was limited to one undergraduate course module in a civil engineering programme, over two levels: level 4 and level 6. Whereby, as part of their programme studies, students are normally required to search the learning and teaching materials for the coursework assignment and exam purposes. It is not possible therefore, to argue that Bb clicks/hit rates have any impact on students' engagement and progression with their learning, but it is possible to see how the clicks/hits linked with attendance and final performance, and this is useful to the module tutors to help them design the more effective online materials. While the insights from the study are limited to the exploration of the interaction with Bb on two engineering modules, and without further examination across other subject areas, no claim to generalisability of the findings can be made; nonetheless, the approach to the data collection and the findings may help to assist tutors and programme managers when designing module guidelines and structuring course materials.

The research methodology

A quantitative approach to data collection was employed. According to Aliaga and Gunderson (2000), the quantitative method is defined as 'explaining phenomena by collecting and analysing the numerical data through mathematically based methods in particular

statistics.' Quantitative methods are frequently described as deductive in nature, in the sense that inferences from tests of statistical hypotheses that lead to general inferences about characteristics of a population (Bryman, 2015).

Hypothesis

In this study, "*it is hypothesised that student engagement via Bb 'hits' rates has a significant relationship or correlation with class attendance, engagement and performance"*

The study's aim was to explore any connection between the students' Blackboard clicks/hits, their attendance on their programme of study, engagement and performance. A statistical analysis test for the correlation between students' online activities via Bb clicks/hits and class attendance were performed to understand the depth of the relationship between student engagement and their impact on student performance. This relationship will help inform further research into how best to enhance teaching and learning practices through the redesign of the module structure, inform guidelines and understand the way students utilise online learning resources via the Bb system.

To minimise the impact of subject-type and student-cohort, two different course modules were included in the study with two levels of student performance in the civil engineering programmes. The study was based on secondary data analysis, which was gathered from the university Bb system and attendance records to reflect student use of online resources and physical participations in the class rooms.

The design of the study contained two aspects. The first aspect of the study aimed to examine the correlation between student engagement via online activities measured through the Bb 'hits' rates and student module performance. The online activities/hits were recorded under the course evaluation tool in the Bb system, based on the use of electronic resources, over the whole academic year in a course module "construction practice" at level 4 and the "risk

management" module at level 6 in the civil engineering programme. The aim of the second aspect of the study was to identify any correlation that could exist between class attendance and module performance of the student at the same modules at level 4 and level 6 respectively.

3.2 Data collection for research

The total number of students included in the study, were 82 and 88 at level 4 and 6 respectively. The details of Bb clicks/hits, records of class attendance and the final grade of each student on the module, at both levels, are shown in Appendix-A. The secondary data for statistical analysis in the study was collected under three aspects/attributes of student engagement as detailed below:

1. *Performance.* For each module, performance data in terms of the final grade of each student were collected at both levels (last Column 'D' of each module, appendix-A).
2. *Attendance:* Class attendance was used as an indicator of levels of student engagement with teaching and tutorials. Both modules comprised a mix of class-based and lab/field-based teaching (third column 'C', appendix-A).
3. *Bb (Hits):* Access to the online learning resources was collected using the course evaluation-reporting tool via Bb. The magnitude of intended usage of e-resources held on the Bb system was considered as indicative levels of student's online engagement. Both the modules had a distinctive design structure holding a wide range of e-learning resources, course administration, information, announcement, discussion blogs and assessment tools on Bb. These comprise of folders containing lecture-supporting resource items, mostly PowerPoint slides, lectures notes, worksheets from practical and tutorial classes, links to other e-resources and other reading online materials links to the relevant websites. The course reporting tool logged as a click/hit each time a folder, page

or item (uploaded e-resources or website URLs) was accessed by a student within these areas. It was assumed that the total volume of 'log-ins' is largely used for productive purposes in their study rather than getting information of hits' rates, which is determined by the site design structure. The numbers of clicks/hits of each student recorded by 'Bb' are shown in appendix-A (Column A show student ID and Column B show Bb 'hits').

3.3 Results from data analysis

3.3.1 Student engagement and performance Level 4

After analysing the sampling data, the results are presented in the tables and graphs below. At first, student engagement in terms of the Bb clicks/hits and performance in relation to the final grade of students at Level 4 in a course module was analysed using SPSS. Two frequency graphs of student ID and mean values of Bb hits, attendance and final grade were drawn and presented in Figures 1 and 2 respectively. Figure 1 reveals that there is similar trend of fluctuation between student engagement and student performance but fails to identify what types of correlation exists between them. Similarly, Figure 2 shows that there is slightly different frequency between attendance and performance, but the line graph does not identify any type of existing correlations between them. Hence, a T-test was then conducted to identify the positive or negative correlation between student performance and engagement at both levels. The results of the paired sample statistics, that is the paired sample correlation and paired sample test are presented in Tables 2, 3 and 4 respectively below.

The T-test results of a paired sample correlation analysis reveals that there is significant positive correlation between the Bb hits and the final grade (0.516, P=0.00 <0.05), and between attendance and final grade (0.590, P=0.00 <0.05) (see Table 3). However, when

the paired sample test was conducted at a 95% confidence level, it was found that student engagement in terms of Bb 'hits' has highly significance on performance with positive t-value (t=9.99, P=0.00<0.05). Whereas, the pair sample test between students' attendance and final grade reveals an insignificant result with negative t values (t = -1.32, p=0.19>0.05). The details of pair test results are shown in Table 4. Moreover, the results confirm that student performance has positive correlation with student engagement in terms of Bb 'hits/click' compared to class attendance, as an initial findings from the study. An additional regression analysis using SPSS was conducted to understand the importance and effect on student performance from student engagement aspects.

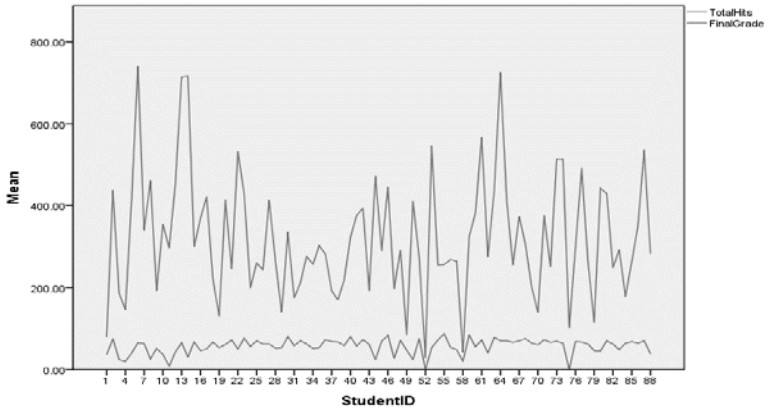

Fig. 1: Line graphs of total hits and final grade of a module at level 4.

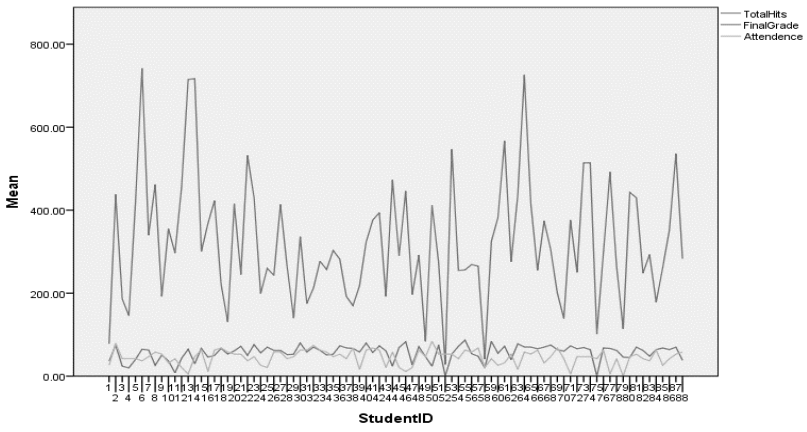

Fig.2: Line graphs of total hits, final grade & attendance of a module at level 4

T-test (Bb 'hits' and final grade) at level 4

Table 2: Paired Samples Statistics at level 4					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Total Bb Hits	149.1852	81	95.49766	10.61085
	Final Grade	53.6543	81	22.67055	2.51895
Pair 2	Attendance	50.2222	81	27.93564	3.10396
	Final Grade	53.6543	81	22.67055	2.51895
Pair 3	Module Content	123.1481	81	88.03396	9.78155
	Final Grade	53.6543	81	22.67055	2.51895
Pair 4	Assignment	19.7654	81	10.70429	1.18937
	Final Grade	53.6543	81	22.67055	2.51895

Table 3 : Paired Samples Correlations at level 4				
		N	Correlation	Sig.
Pair 1	Total Bb Hits & Final Grade	81	.516	.000
Pair 2	Attendance & Final Grade	81	.590	.000
Pair 3	Module Content & Grade	81	.497	.000
Pair 4	Assignment & Final Grade	81	.390	.000

Table 4 : Paired Samples Test at level 4									
	Paired Differences						t	df	Sig. (2-tailed)
	Mean	Std. Deviation		Std. Error Mean	95% Confidence Interval				
					Lower	Upper			
Pair 1	Total Bb Hits-Final Grade	95.531	86.033	9.559	76.507	114.554	9.994	80	.000
Pair 2	Attendance-Final Grade	-3.432	23.394	2.599	-8.605	1.741	-.320	80	.190
Pair 3	Module -Final grade	69.494	79.248	8.805	51.971	87.017	7.892	80	.000
Pair 4	Assignment-Final Grade	-3.889	20.960	2.329	-8.524	-9.254	-.551	80	.000

A regression analysis with automatic linear modelling was then conducted to analyse the linear effect on student performance (final grade) from the aspect of student engagement indicators such as (Bb clicks/hits and attendance). The results of the regression analysis are shown in Figure 3 below. The student performance on the module at Level 4 (mean = 55.74,

SD= 20.566 and N= 77) shows the linear effect with respect to Bb hits and attendance (see Figure 3). The linear modelling result reveals that online activities related to exam preparation has the most important consequence compare to the online activities associated with coursework. Figure 4 reveals that the estimated mean has significant effect on the final grade (student performance) from the engagement aspects of (Bb clicks/hits and attendance). This supports the argument that there exists a positive linear relationship between student engagement and performance. The linear relation of student performance with respect to Bb hits has highly sensible than class attendance at level 4 module of the programme.

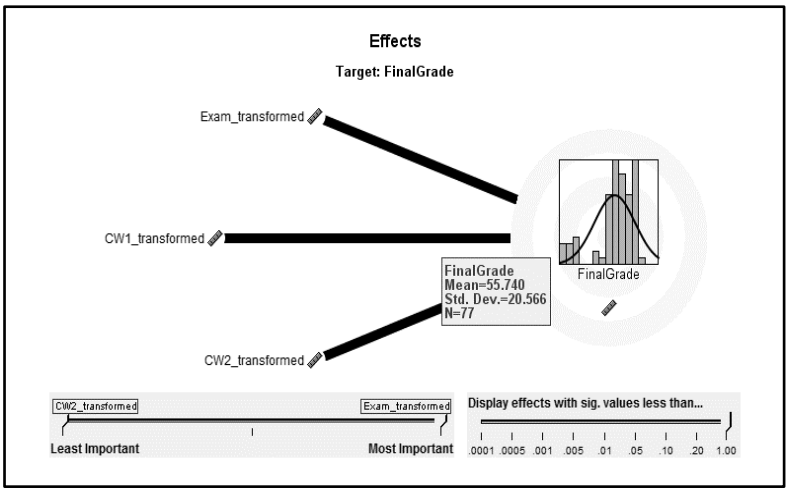

Fig 3: Effect on the final grade from exam and coursework at level 4

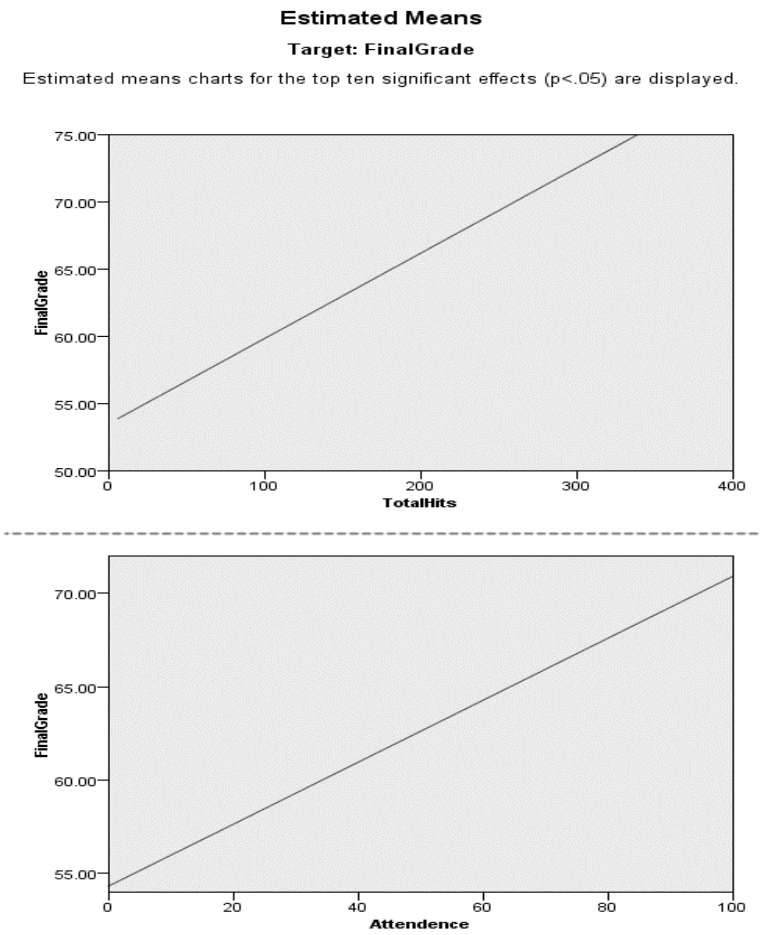

Fig.4: Estimated means chart of student performance with aspect to engagement attributes such as total 'hits' at and attendance at level 4

3.3.2 Student engagement and performance at Level 6

After analysing the research data, study results are presented in tables and graphs below. At first, student engagement aspects in term of Bb 'clicks/hits', attendance and student performance aspect in terms of final grade at Level 6 was analysed using SPSS. Two frequency graphs with student ID and mean values of Bb hits, attendance and final grade were drawn and presented them in Figures 5 and 6 respectively. Figure 5 reveals that there is a similar trend of fluctuation between student engagement aspects and their performance, but the line graph is unable to identify the types of correlation that exists between them. Similarly, Figure 6 shows a slightly different frequency between

attendance and performance and the line graph does not show the correlations between them. Therefore, a T-test was conducted to identify the correlation between student performance and engagement at both levels. Statistical analysis of T-test with paired sample correlation are performed and results are presented in Tables 6, 7 and 8 respectively. T-test results of the paired sample show that there is significant correlation exists between the student engagement aspect of Bb hits and the final grade (0.244, P=0.022 <0.05) but insignificant correlation exist between student attendance and the final grade (0.056, p= 0.00 <0.605) (see Table 7). On other hand, when a paired sample T-test was conducted at 95% confidence level, it was found that student engagement and performance is highly significant with positive t-value (t= 16.93, P = 0.00<0.05), whereas pair test between student attendance and the final grade showed significance results but negative t–value (t=-4.157, p=0.00<0.05) (see Table 8).

The above results confirm that student performance has some relationship with the Bb 'hits' compared to the student attendance. A regression analysis was also conducted with automatic linear modelling using SPSS to understand the importance and consequence on student performance from engagement aspects. The results are shown in Figures 7 and 8 below.

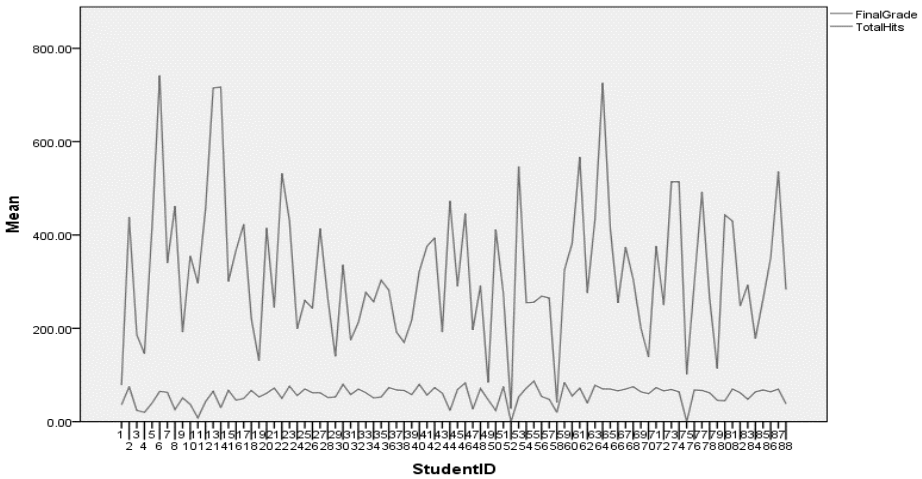

Fig. 5: Line graphs of total hits and final grade of a module at level 6

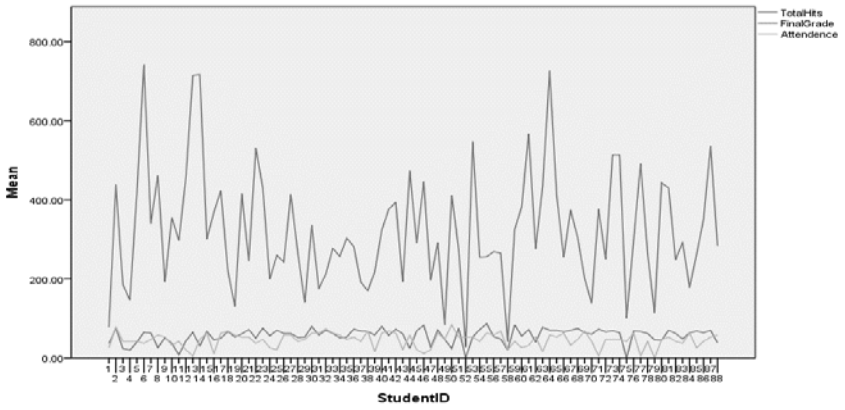

Fig 6: Line graphs of total hits, final grade and attendance of a module at level 6

T- Test (Bb hits and final grade) at level 6

Table 6: Paired Samples Statistics at level 6

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Assignment	77.8068	88	41.56752	4.43111
	Final Grade	56.7386	88	18.59582	1.98232
Pair 2	Module Content	237.1591	88	116.44849	12.41345
	Final Grade	56.7386	88	18.59582	1.98232
Pair 3	Total Bb Hits	321.6818	88	150.21820	16.01331
	Final Grade	56.7386	88	18.59582	1.98232
Pair 4	Attendance	45.5341	88	18.20379	1.94053
	Final Grade	56.7386	88	18.59582	1.98232

Table 7: Paired Samples Correlations at level 6

		N	Correlation	Sig.
Pair 1	Assignment & Final Grade	88	.253	.017
Pair 2	Module Content & Final Grade	88	.229	.032
Pair 3	Total Bb Hits & Final Grade	88	.244	.022
Pair 4	Attendance & Final Grade	88	.056	.605

Table 8: Paired Samples Test at level 6									
		Paired Differences					t	df	Sig. 2-tailed
		Mean	Std. Deviation	Std. Err. Mean	95% Confidence Interval				
					Lower	Upper			
Pair 1	Assignment-Final Grade	21.068	41.021	4.373	12.377	29.760	4.818	87	.000
Pair 2	Module Final Grade	180.421	113.643	12.114	156.342	204.499	14.893	87	.000
Pair 3	Bb Hits - Final Grade	264.943	146.799	15.649	233.840	296.047	16.931	87	.000
Pair 4	Attendance - Final Grade	-11.205	25.286	2.696	-6.562	-5.847	-4.157	87	.000

Moreover, the results and discussions about the regression analysis, which was conducted with linear modelling with the aim of identifying type of relationship between student performance and engagement aspects.

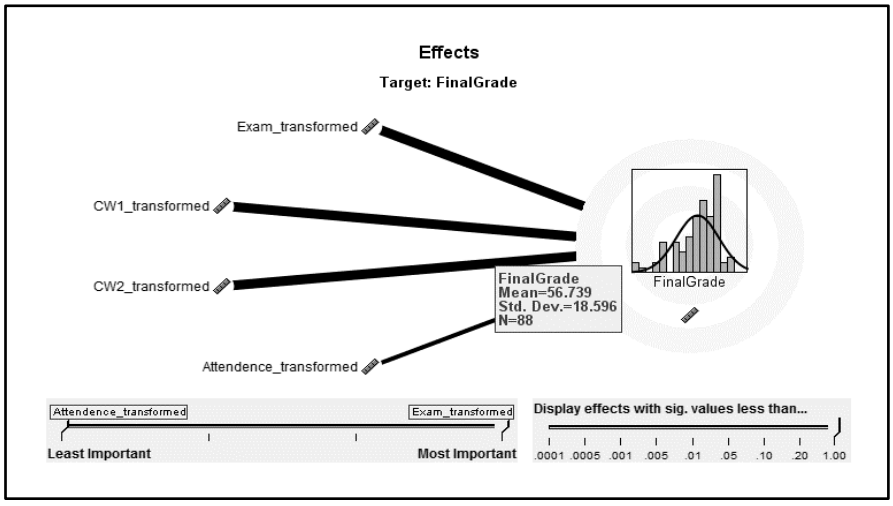

Fig 7: Effect on the final grade from exam and coursework at level 6

The linear modelling results shown in fig 5 above reveal that online activities via Bb 'clicks/hit' are related to exams and have the most important impact compared to online activities in respect of coursework assignment. The student performance on the coursework assignment at level 6 (mean = 56.739, SD= 18.596 and N= 88) indicates the linear relationship between Bb 'click/hits' and attendance (see Figure 7). Figure 8 also reveals that

the estimated mean has significant linear relationship on the final grade from the viewpoints of engagement indicators (BB ‘click/hits’ and attendance). This demonstrates the existence of a linear relationship between student engagement and performance. The linear relation of student performance with respect to Bb hits has less impact than class attendance at level 6.

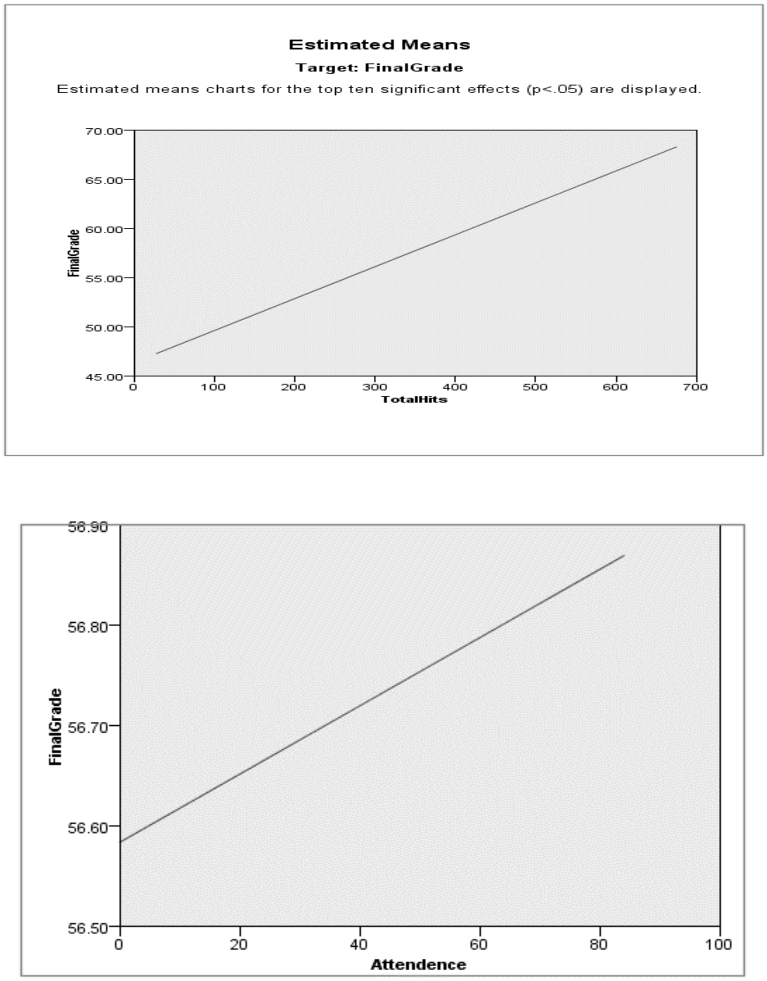

Fig 8: Estimated means chart of student performance and engagement aspects Bb‘hits’ and attendance at level 6

3.4 Discussion of the findings

From the statistical analysis of the research data, the findings are significant at both levels 4 and 6. Firstly, it was recognised that student performance has a positive correlation with student engagement from the aspect of Bb clicks/hits’ at both levels 4 and 6, but the types and

levels of correlation are different at both levels. One of the results showed that the class attendance at level 4 is significant on student performance but it is insignificant at level 6. Secondly, the other key finding found was that student engagement from Bb hits' aspects have a significant and positive connection in improving the student performance at both levels, but it was insignificant on performance from the attendance aspect. The study results also confirmed that student engagement has a linear effect on the student performance from the regression analysis. This exposed the issue that students need to be involved more in online activities in order to improve their performance in a course module. From the above results, it could be argued that the results might be different in other subject areas due to the nature and complexity of different modules, where different levels of online activities take place. For example, lab-based or field-based module must need active participation compare to class-based modules, however online activities can help to improve student understanding and performance.

Conclusion

A review of the literature illustrates the range and complexity of advancements in web-based technologies and reveals the equally diverse ways that students utilise the e-resources available to them (Wang, 2015). In this study, the findings showed that student performance has a positive and significant correlation with student engagement at both levels 4 and 6 in the civil engineering programme, however, both types and level of correlation were found to be diverse at both levels. While class attendance was significant with student performance at level 4, it was shown to be insignificant at level 6; however, from the regression analysis test, the results also confirm that student engagement shows a linear relationship. This suggests that students' involvement in online activities could help to improve their performance on a module. Of course, when various levels of online activities take place in the programmes of

study, it can be argued that the results might be variable in other modules due to the nature and complexity of different subject areas,

Since Marton and Säljö (1976) first introduced the concept that students take different approaches to how they learn the subject, the extensive and rich literature on all aspects of the student learning experience has contributed to the knowledge of the intricacy of students' relationship with their own learning. Across and within different subject domains, students employ a range of deep, surface and strategic approaches to their studies (see *inter-alia,* Gibbs 1992; Bryson and Hand 2007; Fielding 2006; Holmes 2015). Emerging research on the use of digital technologies now explores the intersection between the convergence of learning theories and digital technologies (Altuna and Larek, 2015) and implementing blended learning frameworks could be one of the ways forward in research into the advantages and challenges of e-learning (Adekola, Dale and Gardiner, 2017). The advancements in technology-enhanced learning and teaching (TELT) over the past decade adds another dimension to this complex relationship, so how best to utilise the electronic material to encourage students' engagement with their studies remains an ongoing area for further research.

REFERENCES

ACER (2010b) Doing more for learning: Enhancing engagement and outcomes. *Australasian Student Engagement Report*, Camberwell: Australian Council for Educational Research.

Adekola, J., Dale, V.H.M. and K. Gardiner (2017) Development of an institutional framework to guide transitions into enhanced blended learning in higher education. *Research in Learning Technology.* http://dx.doi.org/10.25304/rlt.v25.1973.

Aliaga, M. and Gunderson, B. (2000) *Interactive Statistics*. (1st Edition), London: Prentice Hall.

Altuna, J. And Lareki, A. (2015) Analysis of the use of digital technologies in Schools that implement different learning theories. *Journal of Educational Computing Research*. 53(2) 205-227.doi:1177/0735633115597869

Blackboard (2014), Report on Student activities in the blackboard under report evaluation, Secondary data collection about blackboard hits of L4 and L6 students in Civil Engineering modules. Unpublished.

Bouhnik, D. and Marcus, T. (2006) Interaction in distance-learning courses, *Journal of the American Society Information Science and Technology*, 57(3), 299–305.

Bryman, A. and Bell, E. (2015*) Business Research Methods*. (4th Edition). Oxford: Oxford University Press.

Bryson, C. and Hand, L. (2007) The Role of Engagement in Inspiring Teaching and Learning. *Innovations in Education and Teaching International* 44 (4), 349-362. doi:10.1080/14703290701602748.

Bryson, C., Hardy, C. and Hand, L. (2009) An in-depth investigation of students' engagement throughout their first year in university. *Paper presented at UK National Transition Conference*, May 22–24 in London.

Fielding, M. (2006) Leadership, Radical Student Engagement and the Necessity for Person-Centred Education. *International Journal of Leadership in Education.* 9(4): 299-313. doi:10.1080/13603120600895411

Flavin, M. and Quintero, V. (2018) UK higher education institutions' technology-enhanced learning strategies from the perspective of disruptive innovation. *Research in Learning Technology* vol.26 http://dx.doi.org/10.25304/rlt.v26.1987

Fredricks, J.A., Blumenfeld, P.C. and Paris, A.H. (2004) School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*. 74 (1), pp. 59–109

Gibb, G. (1992) Improving the quality of student learning through course design. In R. Barnett (Ed.), *Learning to Effect*. Buckingham: SRHE and Open University Press.

Grabe, M. and Christopherson, K. (2005) Evaluating the advantages and disadvantages of providing lecture notes: The role of internet technology as a delivery system and research tool, *Internet and Higher Education*, Vol (8), 291–298.

Harper, S.R. and Quaye, S.J. (2009a) Beyond Sameness, with Engagement and Outcomes for All. In: S. R. Harper & S. J. Quaye (Eds) *Student Engagement in Higher Education* (pp. 1-15). New York and London: Routledge,

Hewitt, A. and Stubbs, S. Supporting law students' skills development online – a strategy to improve skills and reduce student stress? *Research in Learning Technology* http://dx.doi.org/10.25304/rlt.v25.1786

Higher Education Academy (2017) Internationalisation of the curriculum-toolkit: HEA Available from: https://www.heacademy.ac.uk/individuals/student-success/toolkits/internationalising. Accessed 4 June 2017.

Holmes, N. (2015) Student perceptions of their learning and engagement in response to the use of continuous e-assessment in an undergraduate module. *Assessment & Evaluation in Higher Education.* 40 (1) 1-14, doi:10.1080/02602938.2014.881978

Iannone, P. and A. Simpson (2015) Students' preferences in under graduate assessment. Studies in Higher Education. 40(6), 1046-1067, doi:10.1080/03075079.20l3.858683

Jimerson, S., Campos, E. and Greif, J (2003) Towards an understanding of definitions and measures of school engagement and related terms. *The California School Psychologist*, 8, 7–27.

Kahu, E. R. (2013) Framing student engagement in higher education, *Studies in Higher Education*, 38(5), 758-773.

Kahn, P. E. (2014) Theorising student engagement in higher education. *British Educational Research Journal.* 40(6), 1005-1018.

Liaw, S. S., Huang, H. M. and Chen, G. D. (2007) An activity-theoretical approach to investigate learners' factors toward e-learning systems, *Computers in Human Behaviour*, 23, 1906–1920.

Marton, F., and Säljö, R. (1976) On qualitative differences in learning-outcome and process. *British Journal of Educational Psychology.* 46, 4-11.

Raab, R. T., Ellis, W. W. and Abdon, B. R. (2002) Multispectral partnerships in e-learning, a potential force for improved human capital development in the Asia Pacifica, *Internet and Higher Education*, 4, 217–229.

Shesen Guo, Ganzhou Zhang, and Yufei Guo (2016) Social network Analysis of 50 years of international collaboration in the research of educational technology, *Journal of Educational Computing Research.* 53(4), 499-518. doi: 10.1177/0735633115611114.

Stewart, M. Stott, T. and Nuttall, A. (2011) Student Engagement Patterns over the Duration of Level 1 and Level 3 Geography Modules: Influences on Student Attendance, Performance and Use of Online Resources, *Journal of Geography in Higher Education*, Vol. 35 (1), 47-65.

Thomas, L. (2012) *Building Student Engagement and Belonging in Higher Education at a time of change: Final Report from the What Works? Student Retention and Success Programme*. London: Paul Hamlyn Foundation, Higher Education Funding Council for England, The Higher Education Academy and Action on Access.

Trowler, V. (2010) *Student engagement: literature review*. York: Higher Education Academy.

UK Quality Code for Higher Education (2012), *Chapter 5, Student Engagement*, York Higher Education Academy.

Wang, A. I. (2015) 'the Wear Out Effect of a Game-Based Student Response System', Computers and Education, vol. 82, pp. 217-227.

Weatherley, J. N., Grabe, M. and Arthur, E. I. (2003) Providing introductory psychology students access to lecture slides via Bb 5: A negative impact on performance, *Journal of Educational Technology Systems*, 31, 463–474.

Young, S. and Nicols, H. (2017) A reflexive evaluation of technology-enhanced learning. Research in Learning Technology, vol, 25. http://dx.doi.org/10.25304/rlt.v25.1998

Zepke, N. (2014) Student engagement research in higher education: questioning an academic orthodoxy. *Teaching in Higher Education*. 19(6), 697-708.

Zidan, T. (2015) Teaching Social Work in an Online Environment. *Journal of Human Behaviour in the Social Environment*. 25(3) 228-235. doi:10.1018/10911359.2014.1003733

Appendix-A: Information of student engagement and attendance at Level 4 and 6.

Level 4 module:				Level 6 module :			
A	B	C	D	A	B	C	D
Student	Bb Hits	Attendanc	Final Grade	Student	Bb	Attendanc	Final Grade
1	17	0	0	1	78	26	36
2	145	48	61	2	438	79	75
3	186	40	48	3	186	42	24
4	190	76	59	4	146	42	20
5	136	92	57	5	416	42	40
6	172	80	55	6	742	37	65
7	119	40	40	7	340	47	63
8	57	68	48	8	462	58	26
9	120	60	53	9	192	53	51
10	107	24	58	10	355	32	37
11	164	20	56	11	297	42	8
12	179	48	71	12	455	21	43
13	93	44	48	13	715	5	65
14	78	12	53	14	717	47	30
15	168	68	74	15	301	63	67
16	84	24	47	16	368	11	46
17	172	16	71	17	423	63	50
18	178	80	60	18	221	68	67
19	325	100	76	19	131	58	53
20	60	24	51	20	415	53	61
21	177	28	69	21	245	53	72
22	2	0	0	22	532	37	50
23	98	32	9	23	430	47	76
24	281	68	77	24	199	26	56
25	152	40	69	25	260	21	70
26	154	60	65	26	243	58	62
27	90	28	46	27	414	58	62
28	161	96	72	28	266	42	52
29	272	56	65	29	140	47	53
30	335	88	53	30	336	63	80
31	145	0	54	31	175	63	58
32	118	44	48	32	212	74	70
33	86	44	66	33	277	63	62
34	127	56	80	34	257	58	51
35	223	64	77	35	303	47	53
36	280	36	72	36	282	53	73
37	143	40	51	37	192	42	68
38	93	76	62	38	170	68	67
39	124	36	20	39	218	16	58
40	6	44	11	40	323	63	80
41	144	20	58	41	376	68	57
42	23	64	58	42	394	63	73
43	124	32	9	43	192	21	61
44	125	24	61	44	473	58	24
45	89	52	56	45	290	21	69
46	131	88	76	46	446	11	83
47	272	80	69	47	197	21	27
48	118	56	60	48	292	63	71
49	138	52	69	49	84	47	47
50	0	0	0	50	412	84	24
51	222	84	80	51	274	53	75
52	138	24	48				
53	266	88	77				

54	238	56	55
55	77	32	63
56	644	52	75
57	150	44	70
58	54	28	19
59	52	84	51
60	25	32	0
61	121	92	48
62	166	56	76
63	274	88	73
64	9	28	0
65	44	8	21
66	195	96	75
67	328	88	85
68	156	36	68
69	161	80	64
70	147	76	76
71	228	96	64
72	6	12	0
73	163	24	53
74	120	92	56
75	165	88	73
76	218	64	74
77	6	0	0
78	196	52	69
79	53	8	19
80	159	44	52
81	191	40	60
82	119	8	34

52	28	53	0
53	547	53	53
54	255	42	72
55	256	63	87
56	269	58	54
57	265	68	48
58	41	21	20
59	325	42	84
60	382	26	55
61	567	32	72
62	276	53	40
63	435	16	78
64	726	58	70
65	413	53	70
66	255	63	66
67	374	32	70
68	305	47	75
69	201	68	64
70	139	42	60
71	376	5	73
72	250	47	66
73	514	47	69
74	514	47	64
75	101	42	0
76	297	63	68
77	492	5	67
78	265	42	62
79	114	0	46
80	443	47	45
81	430	53	70
82	248	42	62
83	293	37	48
84	178	63	64
85	262	26	68
86	351	42	64
87	536	53	70
88	283	58	38